PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Chia-Gee **WANG**, et al
Serial No.: 10/651,305 Group No.: 1611
Filed: August 28, 2003 Examiner.: G.Polansky
For: RADIOTHERAPY METHOD USING X-RAYS

Attorney Docket No.: **U 014775-5**

Commissioner for Patents
P.O. Box 1450
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DECLARATION UNDER 37 CFR 1.132

I, C.G. Wang, declare and state as follows:

1. I am the co-inventor of the invention described and claimed in the above identified patent application ("the application"). I make this declaration in support of the application to explain the difference between the absorption of gamma-rays in a solid under the Mossbauer effect, as described in the primary reference (Mills U.S. Patent 6,224,848) cited by the Examiner in the prosecution of the application, and the claimed invention. A copy of my curriculum vitae is attached to show my background and technical expertise.

2. The emission and absorption of X-rays by gases, and the emission absorption of gamma-rays in a solid under the Mossbauer effect initiated by a nuclear decay, are both very different from the Auger cascade and the Auger dose in the invention as claimed in the application.

3. In the gaseous medium for X-rays resonance it is the disappearance of X-rays over the medium, while under the Mossbauer probe, it is the disappearance of the nuclear decay signal under certain conditions of the solid, so that it becomes a probe of the solid. Neither of these two approaches provide a controlled external irradiation source to induce

a large radiation dose *in situ* next to the target atom.

4. The Auger cascade commences when the atom, not the nucleus, has an inner shell ionization, which can occur over a K-edge absorption by an external X-ray photon, resulting with a L-shell electron to fill in the K-shell void; while the K/L transition energy is absorbed by the neighboring L-shell electron, which uses the energy to leave the atom and becomes the first low energy Auger electron. The two voids of the L-shell ionizations, with one going to the K-shell and the other leaving the atom, can be filled with two M-shell electrons, resulting with two additional M-shell neighboring electrons, with certain yield, to leave the atom as the second and the third Auger electrons. Next, the N-shell electrons fill the M-shell voids and emit N-shell Auger electrons, etc.

5. In short, a single inner shell ionization with high energy leads to a number of low energy Auger electrons in a cascade, whose kinetic energy are between 12-18 eV with a range of 5-10 atomic dimensions in water.

6. Such a cluster of ionizing low energy electrons would give rise to 10^6 Gray over a very small radius, thus the *in situ* high dose is **initiated by a controlled external photon beam**. This is different from the nuclear decay under a Mossbauer probe, and is also different from the disappearance of resonant X-ray photons in a gaseous medium, neither of which is initiated by controlled external beam.

7. The use of line-emissions in my previous patent Wang in U.S. Patent 5,627,871, does not suggest its use or effectiveness in causing the claimed Auger cascade.

8. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity or the application of any patent issued thereon.

May 15, 09
DATE

C.G. WANG

Chia-Gee Wang (Principal Investigator, Nano)

Education/Training

University of Chicago		1958-63	Physics
Cornell University	Ph.D.	1963-68	Physics, Solid State

Research and Professional Experience

1958-63	While a student at the U. of Chicago, Dr. Wang was also a full time technical staff member at the Lab. for space and astrophysics building the first generation American scientific satellites. He developed the Si(Li) detector for X-ray spectroscopy. He was a graduate student of S. Chandrasekhar at the U.of Chicago
1963-67	While at Cornell University as a graduate assistant, Dr. Wang made extensive use of computer hardware for experimental data processing.
1967-67	As a post-doctoral fellow, Dr. Wang solved the Bethe-Goldstone equation on nuclear matters under Hans Bethe of Cornell U.
1967-72	Dr. Wang was a faculty member of the Physics Dept. of MIT, and taught most courses offered by the department. His specialty was astrophysics.
1972-75	Dr. Wang joined IBM research to do experimental solid state research.
Past 33 years	Dr. Wang has been an inventor-entrepreneur. He was a general partner of Wang Associates, an R & D partnership organized by Dr. A. B. Kinzel, a founding president of the Salk Institute. Dr. Wang founded Profile Diagnostics Sciences in 1986 to do molecular biology and NanoDynamics, Inc. in 1988 to do material science and device physics, including X-ray instruments. NanoDynamics has R&D contracts from the federal gov't. and product related contracts from major commercial companies.

Recent Publications

CG Wang, US Patent 7,430,276, Low dose x-ray mammography method; 2008

CG Wang, US Patent 7,180,981B2, High Quantum Energy Efficiency X-ray Tube and Targets; 2007

CG Wang and R TSU, US Patent 7,023,010. Si/C Superlattice useful for Semiconductor devices; 2006

CG Wang, US Patent 5,627,871; X-Ray Tube and Microelectronic Alignment Process; 1997

CG Wang, US Patent 5,044,001; Method and Apparatus for Investigating Materials with X-rays; 1991

CG Wang and Angus Hepburn, US Patent 5,861,244; 1/19/99. Genetic Sequence Assay using DNA Triple Strand Assay. (The subject matter got a Nobel Prize in Medicine in 2006)

CG Wang, R Tsu, J Lofgren, US Patent 6,376,337 B1; 4/23/02.Epitaxial SiO_x Barrier/Insulation Layer

R. Tsu, A. Filios, C. Lofgren, K. Dovidenko and CG Wang, Evidence of Silicon Epitaxy Beyond an Absorbed Monolayer of Oxygen", Electrochemical and Solid State Letters, 1, 80; 1998.

R. Tsu, A. Filios, C. Lofgren, C. Cahill, J. Vannostrand, and CG Wang, "An Epitaxial Si/O Superlattice Barrier", Solid State Electronics, 40, 221; 1996.